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ABSTRACT

A study was conducted to determine the extent to which science-related instruction occurs as part of instruction in the advanced program of vocational agriculture in Louisiana. Specifically, the study identified instructional objectives in the program that are similar to competencies taught in the state-approved science courses and determined the amount of time spent in vocational agriculture programs in Louisiana on science-related vocational agriculture instruction. A representative sample of 150 Louisiana vocational agriculture teachers identified possible science-related objectives listed in the advanced curriculum guide for agriculture, in the competency outlines for science, and in the high school science curricula. Fifteen Louisiana science teachers, who were knowledgeable about Louisiana vocational agriculture, verified the appropriateness of the objectives identified by the vocational agriculture teachers. On a survey instrument, the sample of vocational agriculture teachers then was asked to indicate whether the objectives were science-related and how much time they spent teaching them. Twenty-one instructional objectives were considered science related, 15 of which were similar in content to the objectives taught in a Louisiana high school course called Environmental Science. Three of the 21 objectives overlapped with two or more science courses. Approximately one-fourth of the instructional time in the advanced program of vocational agriculture was considered spent on science-related instruction. (CML)

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Vocational Education Research

Determining Science-Related Objectives Taught in the Advanced Program of Vocational Agriculture in Louisiana

LOUISIANA STATE UNIVERSITY

1989

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State Superintendent

CE053117

DETERMINING SCIENCE-RELATED OBJECTIVES TAUGHT IN THE ADVANCED PROGRAM OF VOCATIONAL AGRICULTURE IN LOUISIANA

PROJECT DIRECTOR:

Dr. Jeffrey W. Moss

School of Vocational Education

Louisiana State University

Funded by
The State of Louisiana
Department of Education
Office of Vocational Education

Institution Name Louisiana State University

Date December 16, 1988

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This publication represents the cooperative efforts of personnel in the School of Vocational Education at Louisiana State University and the Office of Vocational Education, Louisiana State Department of Education. Several persons contributed significantly to the success of this research project. Project director and principal investigator was Dr. Jeff Moss of Louisiana State University. Fred Sanders and Margaret Sorenson served as graduate assistants for the project. A special note of appreciation is due to Catherine Mitchell for her assistance with the fiscal accounting of the project and to Sherry Earnhart for typing and compiling the final report. Also, appreciation is expressed to the teachers that provided input in the competency identification process.

Don Wood
Assistant Superintendent
Vocational Education

FOREWORD

This research report identifying science-related objectives taught in vocational agriculture programs was produced as a result of a project funded by the Louisiana State Department of Education to Louisiana State University, Baton Rouge, Louisiana. The results of this project were obtained through a cooperative effort between the research staff at Louisiana State University and high school vocational agriculture and science teachers.

An extensive review of the state-adopted science curricula in Biology I, Biology II, Chemistry, Earth Science, Environmental Science, General Science, Physical Science, and Physics was performed by the project staff. Similarly, the curriculum guide for the Advanced Program of Vocational Agriculture in Louisiana (Bulletin 1725, Vols. I & II) was examined. A substantial amount of overlapping subject matter was discovered and is the focus of this research report.

An outcome of this research effort will be an increased awareness of the similarity between the objectives taught in high school science and vocational agriculture. The results are important to teacher educators, state department personnel and vocational teachers as they seek to improve instruction in vocational education courses within the state.

Wilmer S. Cody
State Superintendent of Education

DETERMINING SCIENCE-RELATED OBJECTIVES TAUGHT IN THE ADVANCED PROGRAM OF VOCATIONAL AGRICULTURE IN LOUISIANA

Considerable attention has focused upon improvement of student competence in the field of science at the secondary school level. Many states have responded by revising the high school curricula so as to increase the required number of science credits needed for graduation. Typically, these revisions have meant that high school students would enroll in additional science courses such as general science, biology or chemistry.

In the past, little consideration has been given to the potential for teaching science competencies in other than traditional science courses. The Association for Supervision and Curriculum Development (ASCD, 1985) reports that as a result of new academic credit requirements, students merely "take more of the usual courses in the traditional subjects." The report further charges that, "Most states have neither sought to identify the content of additional courses, nor have they generally appropriated new dollars to upgrade curriculum and instruction." The concluding result is that the approximately 24 percent of students who choose to enter the work force after graduation may be harmed by the new requirements (AVA, 1985).

As the number of required courses has increased, the number of elective courses available to the student has simultaneously decreased. In most cases, vocational education courses are considered as elective courses. Consequently,

enrollments in vocational education have decreased as the number of required high school courses has increased. Dyrenfurth (1985) conducted a national survey of high school graduation requirements and concluded,

> In state after state, the number of 'basic' courses required for graduation is being increased. The variable result is a single-focus curriculum that gravely under serves students, for they will have little or no time left in their secondary school years to take practical arts and vocational subjects (p. 43).

However, some states are examining vocational education courses such as vocational agriculture for use as a means of teaching science competencies to high school students. In a limited number of states, students completing a sequence of vocational courses are allowed to substitute those courses for required science credit. In Oklahoma, the State Board of Education adopted a policy which allows a school to waive a unit of credit in mathematics and a unit of credit in science providing a student completes six units of credit in vocational agriculture. One unit of credit in either math or science may be waived if a student completes at least three units of vocational agriculture.

In Virginia, a state policy allows for completion of a sequence of courses for occupational preparation in agriculture as an alternative to the requirement of a math or science course in the diploma program.

Recently, several states (Illinois, Missouri, North Carolina, Texas, and Louisiana) have initiated studies of the

relationship between science competencies taught in traditional science courses and competencies taught in vocational agriculture. The studies report that a substantial overlap exists between science competencies and agricultural competencies or objectives. For example, Briers (1986) conducted a study to determine the extent to which vocational agriculture in Texas provided opportunities for students to develop concepts and skills in mathematics and science. Seventy-five percent of the topics taught in vocational agriculture were judged by a panel of science teachers as developing concepts and skills in science.

In 1986, Moss conducted a study for the Louisiana State Department of Education to identify science-related competencies taught in the Basic Program of Vocational Agriculture in Louisiana (Ag I & Ag II). The following conclusions were made on the basis of that research.

1. A substantial number of science-related instructional objectives are included in the Basic Program of Vocational Agriculture in Louisiana.
2. The Basic Program of Vocational Agriculture in Louisiana contains science-related objectives in both levels of instruction, Vocational Agriculture I and Vocational Agriculture II.
3. The Basic Program of Vocational Agriculture in Louisiana includes overlapping objectives with each of the state-approved science courses.

4. The most commonality between vocational agriculture instructional objectives and science objectives is in the state approved course, Environmental Science.
5. Louisiana vocational agriculture teachers are teaching subject matter similar to science teachers in the public schools.

A recommendation from the study of the basic curriculum (Vo-Ag I and Vo-Ag II) was that a similar study of the advanced curriculum (Vo-Ag III and Vo-Ag IV) should be conducted.

PURPOSE AND OBJECTIVES

The purpose of this study was to determine the extent to which science-related instruction occurs as a part of instruction in the Advanced Program of Vocational Agriculture in Louisiana. In order to achieve this purpose two objectives served as guidelines in the performance of the project.

1. To identify instructional objectives in the Advanced Program of Vocational Agriculture in Louisiana which are similar to competencies taught in state-approved science courses.
2. To determine the amount of time spent in vocational agriculture programs in Louisiana on science-related vocational agriculture instruction.

PROCEDURE

To accomplish the objectives previously outlined, the advanced curriculum guide for agriculture and the competency outlines for science were examined to identify possible

objectives in agriculture that were science-related. The state-adopted curricula for the high school science courses, biology, chemistry, earth science, environmental science, general science, physics, and physical science were used as the source for identifying the competencies taught in high school science programs.

The Advanced Program of Vocational Agriculture in Louisiana (Bulletin 1725, Vols. I & II) was used as the source for identifying agricultural objectives taught in Louisiana vocational agriculture programs. This curriculum guide was published in 1983 by the Office of Vocational Education, Louisiana Department of Education, and is used in all programs throughout the state. This advanced program of studies, also referred to as Vocational Agriculture III and Vocational Agriculture IV, provides specialized training at the 11th and 12th grade levels.

Two groups of knowledgeable personnel assisted in the identification of the science-related objectives. Input from a sample of Louisiana vocational agriculture teachers was sought to determine science-related instructional objectives and time spent on science-related instruction. Two hundred forty-eight vocational agriculture teachers comprised the population from which the research sample was drawn. A sample size of 150 was determined using the formula for calculating the sample size needed when the size of the population is known and the response measure dichotomous as discussed in

Educational and Psychological Measurement by Krejcie and Morgan (1970). The formula was calculated using a 95% confidence level for the table value of chi-square and 0.05 as the degree of accuracy expressed as a proportion.

A select sample of 15 Louisiana science teachers was asked to verify the appropriateness of the objectives identified as science-related by the vocational agriculture teachers. The science teachers were knowledgeable of vocational agriculture and served to further validate the objectives as being science-related.

A survey instrument was developed, validated, field tested, and sent to the sample of vocational agriculture teachers. The teachers were asked to determine if the listed objectives were science-related and to indicate the amount of time spent teaching the objectives.

RESULTS

Usable information was obtained from 107 respondents or 71% of the sample. A total of 21 instructional objectives from the Advanced Program of Vocational Agriculture in Louisiana curriculum guide was identified as being science-related. The greatest similarity between the curricula in vocational agriculture and a specific high school science course is in Environmental Science. Fifteen agricultural objectives were of similar content to the objectives taught in Environmental Science. It was also found that 3 of the 21 objectives overlapped with two or more science courses. The science-

related agriculture objectives identified in the study are shown in Table 1.

Information is also presented in Tables 2-6 showing specific relationships between the agricultural instructional objectives from the Advanced Program of Vocational Agriculture in Louisiana and the science objectives for each science course investigated in this study. The science objectives are contained in the curriculum guides for the state-approved science courses where there is overlapping subject matter content.

Table 1
Agricultural Objectives Taught in the Advanced Program of Vocational Agriculture Overlapping with Competencies Taught in Science Courses.

Biology I	Chemistry	Earth Science	Environmental Science	Physical Science	Agricultural Objectives
			*		List types of pesticides and their specific use
			*		Describe precautions that need to be taken in selecting, storing, and applying pesticides
			*		List the advantages of using pesticides
			*		List the resources needed for man to exist and reasons for protecting them
			*		Explain how pesticides disrupt a food chain
			*		Classify pesticides according to build-up
			*		List disadvantages of using pesticides
			*		Identify possible sources of energy for the home and place of business
	*		*		Identify how energy can be conserved on the farm

(table continues)

Table 1 (continued)

Biology I	Chemistry	Earth Science	Environmental Science	Physical Science	Agricultural Objectives
*		*	*		Define natural resources and the categories of natural resources
			*		Identify problem areas in natural resource conservation
			*		List ways to conserve natural resources
*			*		Describe the food chain
			*		List steps in wildlife management
			*		Identify common wildlife in Louisiana
				*	List the three variables that affect the properties of steel
				*	Describe basic procedure to identify various metals
	*				Name and describe the three types of flames associated with oxy-acetylene welding
				*	List the different classifications of metals that can be cut with the oxy-acetylene torch
				*	Describe how an electric motor operates
				*	Identify common types of metal

Table 2
Relationship Between Agricultural Instructional Objectives and Science Objectives in Biology.

Agricultural Objectives	Science Objectives [1]
Define natural resources and the categories of natural resources	B.209 The student will differentiate between renewable and non-renewable resources
Describe the food chain	B.190 The student will define the terms food chain and food web

[1] Identified as objectives in the Biology I Curriculum Guide (Bulletin 1646 - Revised 1988) Office of Academic Programs, Department of Education, State of Louisiana

Table 3
Relationship Between Agricultural Instructional Objectives and Science Objectives in Chemistry.

Agricultural Objectives	Science Objectives [1]
Name and describe the three types of flames associated with oxy-acetylene	C.5 Demonstrate the correct laboratory techniques (use of bunsen burners)

[1] Identified as an objective in the Chemistry Curriculum Guide (Bulletin 1660) Office of Academic Programs, Department of Education, State of Louisiana

Table 4
Relationship Between Agricultural Instructional Objectives and Science Objectives in Earth Science.

Agricultural Objectives	Science Objectives [1]
Identify how energy can be conserved on the farm	ES.104 State energy conservation practices applicable to daily life
Define natural resources and the categories of natural resources	ES.101 Differentiate between non-renewable and renewable natural resources
	ES.102 State advantages and disadvantages of renewable and non-renewable resources

[1] Identified as objectives in the Earth Science Curriculum Guide (Bulletin 1643) Office of Academic Programs, Department of Education, State of Louisiana

Table 5
Relationship Between Agricultural Instructional Objectives and Science Objectives in Physical Science.

Agricultural Objectives	Science Objectives [1]
List the three variables that affect the properties of steel	Phy.Sc.17 Differentiate among specific physical and chemical properties of matter
Describe basic procedures to identify various metals	
List the different classifications of metals that can be cut with the oxy-acetylene torch	
Identify common types of metal	
Describe how an electric motor operates	Phy.Sc.34 Determine magnetic fields

[1] Identified as objectives in the Physical Science Curriculum Guide (Bulletin 1644) Office of Academic Programs, Department of Education, State of Louisiana

Table 6
Relationship Between Agricultural Instructional Objectives and Science Objectives in Environmental Science.

Agricultural Objectives	Science Objectives [1]
List types of pesticides and their use	ES.70 The student will trace uses of pesticides since 1900
Describe precautions that need to be taken in selecting, storing, and applying pesticides	ES.71 The student will define and differentiate between persistence and resistance in use of pesticides
List the advantages of using pesticides	ES.72 The student will recognize that pesticides must be carefully used since they are detrimental to many unintended species when used improperly
List the disadvantages of using pesticides	
Explain how pesticides disrupt a food chain	ES.73 The student will list types of natural pest control methods and compare the effects to those of artificial pesticides
Classify pesticides according to build-up	ES.74 The student will define biological magnification and describe how it is harmful to organisms
List the resources needed for man to exist and reasons for protecting them	ES.130 The student will differentiate between renewable and non-renewable resources

(table continues)

Table 6 (continued)

Agricultural Objectives	Science Objectives [1]
Define natural resources and the categories of natural resources	ES.132 The student will demonstrate an understanding of how dependent the nations of the world are on many resources
Identify possible sources of energy for the home and place of business	ES.158 The student will be able to predict alternative kinds of energy sources that are not presently in use, but are possible future sources of energy as technology advances
Identify how energy can be conserved on the farm	
Identify problem areas in natural resource conservation	ES.101 The student will describe the origin of the conservation and environmental protection movement
List ways to conserve natural resources	ES.106 The student will define conservation as the wise use and protection of national resources to ensure an adequate supply for the present and future
Describe the food chain	ES.21 The student will be able to define the terms food chain and food web and describe the flow of energy through an ecosystem
List steps in wildlife management	ES.115 The student will realize that wildlife must be conserved and often controlled to prevent extinction of overpopulation, and that direct exploitation by man can hasten the process

Table 6 (continued)

Agricultural Objectives	Science Objectives [1]
Identify common wildlife in Louisiana	ES.116 The student will describe how natural processes can also hasten extinction or cause overpopulation ES.117 The student will describe how wildlife is economically and aesthetically important. This would include: a. Wildlife has scientific and ecological values b. Wildlife has social and political values c. Wildlife has commercial and economic values ES.118 The student will recognize that wildlife is one of our basic natural resources and can be managed and conserved. a. Management practices are based on ecological applications and natural laws b. Conservation of wildlife promotes the protection and the preservation of wildlife

(table continues)

Table 6 (continued)

Agricultural Objectives	Science Objectives [1]
	ES.119 The student will describe how the regulated harvest of wildlife by recreational hunting and fishing is a management method of removing surpluses which might be removed naturally

[1] Identified as objectives in the Environmental Science Curriculum Guide (Bulletin 1792) Office of Academic Programs, Department of Education, State of Louisiana

To further document the teaching of these science-related instructional objectives, the vocational agriculture teachers indicated the amount of instructional time spent in teaching the objectives. The average hours of science-related instruction reported by the teachers is shown in Table 7. The advanced curriculum is divided into twelve subject matter categories. Additionally, local option hours are set-aside for the teacher to better meet student and community needs.

The greatest number of hours spent in science-related instruction is in the instructional area of Conservation. Teachers reported spending 11.4 hours of instructional time teaching instructional objectives that overlap with science competencies and an average of 4.8 hours on additional local option science-related objectives.

Six instructional areas, Farm/Agribusiness Planning, Employment Seeking Skills, Soldering, Tractor Maintenance, Small Engines, and Farm Structures contained science-related instruction only as a component of local option time. Overall, the teachers reported that approximately one-fourth (24%), of the instructional time spent in teaching the advanced program of vocational agriculture in Louisiana is spent on science-related instruction. Implications of these findings for future programming of vocational agriculture in Louisiana are discussed in the conclusions and recommendations that follow.

Table 7
Science-Related Instructional Time by Subject Matter Areas for the Advanced Program of Vocational Agriculture in Louisiana

Instructional Area	Hours Teaching Science-Related Instructional Objectives	Hours Local Option
Farm/Agribusiness Planning	0	4.3
Employment Seeking Skills	0	4.6
Agricultural Chemicals		2.9
Safe Use of Chemicals and First for Poisoning	4.6	
List types of pesticides and their specific use		
Describe precautions that need to be taken in selecting, storing, and applying pesticides		
Advantages and Disadvantages of Pesticides	4.3	
List the advantages of using pesticides		
List the resources needed for man to exist and reasons for protecting them		
Explain how pesticides disrupt a food chain		

(table continues)

Table 7 (continued)

Instructional Area	Hours Teaching Science-Related Instructional Objectives	Hours Local Option
Classify pesticides according to build-up		
List disadvantages of using pesticides		
Conservation		4.8
Conserve Energy in the Home and at the Place of Business	3.3	
Identify possible sources of energy for the home and place of business		
Identify how energy can be conserved on the farm		
Natural Resources	3.1	
Define natural resources and the categories of natural resources		
Identify problem areas in natural resource conservation		
Wildlife	5.0	
Describe the food chain		
List steps in wildlife management		

(table continues)

Table 7 (continued)

Instructional Area	Hours Teaching Science-Related Instructional Objectives	Hours Local Option
Identify common wildlife in Louisiana		
Arc Welding		5.4
Metal Identification	3.8	
List the three variables that affect the properties of steel		
Describe basic procedure to identify various metals		
Oxy-Acetylene Welding		2.7
Set-up and Techniques of Welding Cutting and Brazing	6.0	
Name and describe the three types of flames associated with oxy-acetylene welding		
List the different classifications of metals that can be cut with the oxy-acetylene torch		
Soldering	0	2.2
Electricity		3.6
Operating Electric Motors	3.8	
Describe how an electric motor operates		

(table continues)

Table 7 (continued)

Instructional Area	Hours Teaching Science-Related Instructional Objectives		Hours Local Option
Tractor Maintenance, Operation & Safety	0		4.2
Small Engines	0		9.2
Farm Structures and Facilities	0		4.4
Cold Metal			
Procedures for Working with Cold Metal	2.3		2.3
Identify common types of metal			
Hours of Science-Related Instruction	**36.2**		**50.6**
Total Hours		**86.8**	

CONCLUSIONS and RECOMMENDATIONS

The following conclusions and recommendations are made on the basis of this research study.

Conclusions

1. Science-related instructional objectives are included in the Advanced Program of Vocational Agriculture in Louisiana and are being taught in vocational agriculture programs.
2. The Advanced Program of Vocational Agriculture in Louisiana includes overlapping objectives with five state approved science courses with the most overlap occurring for the science course, Environmental Science.
3. Teachers spend more "local option" time on science-related instruction than time spent on science-related objectives that are a part of the advanced curriculum guide.
4. Approximately one-fourth of the instructional time in the Advanced Program for Vocational Agriculture is spent on science-related instruction.
5. Less time is spent on science-related instruction in the Advanced Program of Vocational Agriculture (Ag III & IV) than in the Basic Program of Vocational Agriculture (Ag I & II).

Recommendations

1. Competencies in agriscience and emerging occupations and technologies should be identified and form the basis for

an updating of the Advanced Program of Vocational Agriculture in Louisiana.

2. The advanced curriculum guide (Bulletin 1572) should be revised to reflect the changing scientific nature of modern agriculture.

3. Since a substantial number of agricultural objectives in the Basic and Advanced Curriculum for Vocational Agriculture in Louisiana overlap with the science course, Environmental Science, substitute credit should be sought for this course after updating the agriculture curriculum.

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A P P E N D I X I

Survey instrument for data collection

IDENTIFICATION OF SCIENCE-RELATED INSTRUCTIONAL OBJECTIVES IN THE ADVANCED PROGRAM OF VOCATIONAL AGRICULTURE IN LOUISIANA
(Vocational Agriculture Survey)

The purpose of this survey instrument is to collect information to identify science-related instructional objectives taught in Vocational Agriculture III and Vocational Agriculture IV (The Advanced Program of Vocational Agriculture in Louisiana). The advanced curriculum guide was reviewed by the research project staff and possible science-related lesson topics and objectives are listed on the questionnaire. Please rate each objective as it relates to the following:

1. Agree or Disagree that the lesson topic/objective is science-related
2. Estimate time spent teaching the lesson topic if science-related; (estimate time to the nearest 1/2 hour; consider one class period as 1 hour).

Please add any science-related lesson topics or objectives that you teach that are not listed on the questionnaire.

Lesson Topic/Objective	Science-related		Time Spent Teaching Lesson
	Agree	Disagree	
EXAMPLE 1. List chemical properties of soil 2. State the primary aim of the FFA	✓	✓	(1/2) hours
UNIT: Farm/Agribusiness Planning - No Objectives Identified			
Other _____ _____ _____ _____			( ) hours
UNIT: Employment Seeking Skills - No Objectives Identified			
Other _____ _____ _____ _____			( ) hours

Lesson Topic/Objective (cont.)	Science-related		Time Spent Teaching Lesson
	Agree	Disagree	
UNIT: Agricultural Chemicals			
Safe Use of Chemicals and First Aid for Poisoning			( ) hours
List types of pesticides and their specific use			
Describe precautions that need to be taken in selecting, storing, and applying pesticides			
Advantages and Disadvantages of Pesticides			( ) hours
List the advantages of using pesticides			
List the resources needed for man to exist and reasons for protecting them			
Explain how pesticides disrupt a food chain			
Classify pesticides according to build-up			
List disadvantages of using pesticides			
Other_____			( ) hours
_____			
_____			
_____			
UNIT: Conservation			
Conserve Energy in the Home and at the Place of Business			( ) hours
Identify possible sources of energy for the home and place of business			
Identify how energy can be conserved on the farm			
Natural Resources			( ) hours
Define natural resources and the categories of natural resources			

Lesson Topic/Objective (cont.)	Science-related		Time Spent Teaching Lesson
	Agree	Disagree	
UNIT: Conservation (cont.)			
Identify problem areas in natural resource conservation List ways to conserve natural resources Wildlife Describe the food chain List steps in wildlife management Identify common wildlife in Louisiana Other _____ _____ _____ _____			( ) hours ( ) hours
UNIT: Arc Welding			
Metal Identification List the three variables that affect the properties of steel Describe basic procedure to identify various metals Other _____ _____ _____ _____			( ) hours ( ) hours

Lesson Topic/Objective (cont.)	Science-related: Agree	Science-related: Disagree	Time Spent Teaching Lesson
UNIT: Oxy-acetylene Welding			
Set-up and Techniques of Welding, Cutting and Brazing Name and describe the three types of flames associated with oxy-acetylene welding List the different classifications of metals that can be cut with the oxy-acetylene torch Other _____ _____ _____ _____			( ) hours ( ) hours
UNIT: Soldering - No Objectives Identified			
Other _____ _____ _____ _____			( ) hours
UNIT: Electricity			
Operating Electric Motors Describe how an electric motor operates Other _____ _____ _____ _____			( ) hours ( ) hours

Lessson Topic\Objective (cont.)	Science-related		Time Spent Teaching Lesson
	Agree	Disagree	
UNIT: Tractor Maintenance, Operation and Safety - No Objectives Identified			
Other _____ _____ _____ _____			( ) hours
UNIT: Small Engines - No Objectives Identified			
Other _____ _____ _____ _____			( ) hours
UNIT: Farm Structures and Facilities - No Objectives Identified			
Other _____ _____ _____ _____			( ) hours
UNIT: Cold Metal			
Procedures for Working with Cold Metal Identify common types of metal Other _____ _____ _____ _____			( ) hours ( ) hours

PLEASE WRITE ADDITIONAL LESSON TOPICS/OBJECTIVES CONCERNING SCIENCE-RELATED INSTRUCTION THAT SHOULD BE PROVIDED THROUGH THE VOCATIONAL AGRICULTURE PROGRAM

PLEASE RETURN TO:

Jeffrey W. Moss
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Baton Rouge, LA 70803

THANK YOU FOR PARTICIPATING IN THIS STUDY

A P P E N D I X II

Additional lesson topics/objectives suggested by teachers that are science-related and should be included in the Advanced Program of Vocational Agriculture in Louisiana

IDENTIFICATION OF SCIENCE-RELATED INSTRUCTIONAL OBJECTIVES IN THE ADVANCED PROGRAM OF VOCATIONAL AGRICULTURE IN LOUISIANA

ADDITIONAL LESSON TOPICS/OBJECTIVES CONCERNING SCIENCE-RELATED INSTRUCTION THAT SHOULD BE PROVIDED IN THE ADVANCED PROGRAM OF VOCATIONAL AGRICULTURE IN LOUISIANA.

UNIT 1 Farm/Agribusiness Planning

1. Soil conservation as land use, chemicals used in crop production
2. Ag. business terms, budget preparation, income, expenses
3. Use of computers, setting up programs for farm business
4. Farm planning

UNIT 2 Employment Seeking Skills

1. Job interviews, job hunting, pre-job preparation
2. Job applications, job interviews
3. Areas of employment, resume and application preparation
4. How to use local employment agencies, how to do a resume
5. How to seek employment

UNIT 3 Agricultural Chemicals

1. Types of chemicals used on local crops
2. Options to pesticide use (organic methods)
3. Use of chemicals in the home
4. Equipment needed to apply chemicals
5. Pesticide certification
6. Reading labels on pesticide containers
7. Identify insects to be controlled

UNIT 4 Conservation

1. Taxidermy, anatomy
2. Crawfish production
3. Catfish production
4. Types of plants and wildlife
5. Hunter safety
6. Trespassing laws and hunter ethics

UNIT 5 Arc Welding

1. Compare properties of different metals and their uses
2. Tensile strength and safety

3. Metal inert gas welding, tungsten inert gas welding, plasma cutting, and other new welding techniques
4. Arc welding, mig welding
5. Density, recycling
6. Methods of welding alloys
7. Basic welding techniques

UNIT 6 Oxy-acetylene Welding

1. Properties of gases and uses when combined
2. Types of metals which can be welded or brazed
3. Basic oxy-acetylene welding

UNIT 7 Soldering

1. Explain in some depth that freezing is not only related to water/ice but also to metals
2. Properties of the flame needed, properties of metals
3. How different metals interact with each other
4. Where soldering should be used and the ways to accomplish it
5. Types and methods
6. Different solder mixes and use of each
7. Describe melting point and oxide formation
8. Types of metals
9. Properties of the types of solder, melting points, properties of flux
10. How to solder pipe (steel and copper) and aluminum

UNIT 8 Electricity

1. Identify trouble spots, path from generator to farm
2. Magnetism, polarity, coils, transformers
3. Principles
4. Theory of electric current, safety, fundamentals of electricity
5. Electrons and atoms, flow of electrons in different conductors
6. Conductors and insulators
7. Physical relation by the use of different size pulleys
8. Ohm's law
9. Electric wiring
10. Basic wiring, electric energy, conservation of electric energy
11. Types of electric motors

UNIT 9 Tractor Maintenance, Operation and Safety

1. Calculation of areas covered, time, rates of

application, speed and pressure of spray, mixing of herbicides
2. Pollution versus no-till
3. Types of bearings, types of oils and greases
4. Maintenance
5. Effect of friction to wear, role of lubricant
6. Horsepower, torque, gear ratios, fuel economy
7. Hydraulics, torque, horsepower
8. Tractor safety
9. Identify early farm machinery

UNIT 10 Small Engines

1. Theory of operation
2. Basics of small engines
3. Compression ratio, piston displacement, theory of operation, flow of electricity, motion and centrifugal force
4. Combustion/compression ratio/horsepower, physics
5. Compression, ignition, carburetion, fuel and lubrication
6. Maintenance
7. How energy is produced through engines
8. Internal combustion, oil viscosity
9. Simple mechanics of internal combustion engines

UNIT 11 Farm Structures and Facilities

1. Reading rulers and angles, rise over run, calculating areas, cement mixes
2. Insulation and physical planning of building and land use
3. Concrete properties and functions
4. Types of wood, treatment of wood
5. Determining angles to be cut
6. Artificial atmospheres, cooling systems (green houses)
7. Types of buildings needed for different farms
8. Stress, angles, concrete mixtures
9. Building construction and maintenance
10. Site selection, soil foundation
11. Barn and shed construction, livestock handling facilities
12. Ventilation, energy conservation

UNIT 12 Cold Metal

1. Physical properties in different areas of stress and climate
2. Properties of metals
3. Metal fatigue, methods of joining, corrosion
4. Properties of metals
5. Tempering metals
6. Physical and chemical make up

7. Sources and methods of obtaining metals
8. Annealing and tempering of metals

OTHER RESPONSES

1. Soil use and conservation
2. Feeds/nutrition, reproductive physiology, plant identification, disease and parasite control
3. Climatology, meats, botany, greenhouse management, biology, water quality management, entomology
4. Aquaculture science, greenhouse science, meat science
5. Raising of aquaculture crops, plants and animals
6. Food preservation
7. Forestry; identifying trees of Louisiana, evaluating a stand of trees, managing a forest
8. Basic computer instruction in Vo. Ag. which, when incorporated into the present curriculum, could be substituted for the computer literacy requirement for high school students
9. Anatomy, types of muscles, diseases which accompany pork
10. Weighing and measuring seasonings for sausage
11. Plant science (diseases), soils (fertilization)
12. Landscape architecture
13. Germination of seed
14. Soil acidity and ph
15. Genetics and heredity
16. Artificial insemination
17. Veterinary science
18. Hybrid plants and animals
19. Reproductive physiology
20. Forest products use
21. Water conservation
22. Soil testing
23. Sanitation
24. Safety in the work place
25. Use of La. produced products
26. Processing of agricultural products
27. Computer training
28. Cell morphology
29. Plant structure and life processes
30. Internal structure of animals
31. Oxidation reactions in welding
32. Ion exchange in the soil
33. Tree propagation
34. Forest management practices
35. Pulp and paper production
36. Christmas tree production
37. Forest diseases and insects